

**ABSTRACT – “Lessons Learned from Ares 1 Upper Stage Structures and Thermal Design”**

The Ares 1 Upper Stage was part of the vehicle intended to succeed the Space Shuttle as the United States' manned spaceflight vehicle. Although the Upper Stage project was cancelled, there were many lessons learned that are applicable to future vehicle design. Lessons learned that are briefly detailed in this Technical Memorandum are for specific technical areas such as tank design, common bulkhead design, thrust oscillation, control of flight and slosh loads, purge and hazardous gas system. In addition, lessons learned from a systems engineering and vehicle integration perspective are also included, such as computer aided design and engineering, scheduling, and data management. The need for detailed systems engineering in the early stages of a project is emphasized throughout this report. The intent is that future projects will be able to apply these lessons learned to keep costs down, schedules brief, and deliver products that perform to the expectations of their customers.